

### REMARKS

Claims 1-27 stand rejected. Applicants request reconsideration of the rejections based on the arguments presented below. Comments from the Examiner extracted from previous Office Actions are in small, bold type.

Claims 1-3, 15-20 and 27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al. in view of Dorn et al. essentially for reasons of record as set forth in paragraph 1 of the Office Action dated 08/08/2006. That paragraph reads:

**“... Nutt discloses forming a waveguide whose core is formed on a substrate followed by poling to lock the chromophores in place and also teaches that the polymers used would be crosslinkable. Essentially, the primary references lack a showing of poling and crosslinking the first -core—film and then forming a second film in close proximity to the first and then poling and crosslinking the second one. As noted in the previous actions, Dorn et al discloses these general steps in forming a waveguide and one of ordinary skill would have obviously used them in the process of the primary reference dependent on the final use desired for the waveguide. While it is noted that the optical switch of Dorn et al does not have a core as set forth in the instant claims, it is submitted that the process of forming additional layers and poling and crosslinking them would have been obvious to add additional cladding and waveguide layers. To this end, Zhang et al has been additionally applied to show a waveguide similar to that of Nutt in which cladding, core and cladding layers are formed followed by a poling of these. It is nothing but conventional in this art to make multilayered waveguides so that the final element would have the desired refractive index profile and physical properties designed for its ultimate use.”**

However, the Examiner has reversed his application of Dorn as the primary reference presumably based on Applicants' prior arguments. Now Zhang is the primary reference, and Nutt has been dropped from the rejection. Whether Zhang or Dorn is the primary reference in the Examiner's rejection is inconsequential; neither reference, alone or in combination, renders Applicants' claimed methods for making a waveguide obvious, as is clear following the arguments set forth below.

The instant Office Action states:

**“... applicant merely argues the references separately when the rejection is based on the combination.”**

Applicants strongly disagree and conclude from this statement that the Examiner has not fully considered the arguments of the last four responses, in which Applicants have pointed out the impropriety of the obviousness rejections. It became the Applicants' burden to illustrate to the Examiner that the device described by Dorn, which, throughout the prosecution of this case has

been separately referenced as §102(a), 102(b), and 103(a) prior art, is not a waveguide; it is an optical switch. Applicants have repeatedly pointed out the distinct differences between Dorn's optical switch and the claimed waveguide method, and, after a telephone conversation with the Examiner, agreed to amend the claims to advance prosecution. Still, the Examiner continues to cite Dorn, even though (emphasis added):

**"Applicant's comments directed to Dorn et al. as the primary reference have been noted and are persuasive."** (P. 3, instant Office Action);

and

**"It is noted and agreed with that the reference to Dorn et al. is not directed to a waveguide of the instant type."** (Ibid).

Nevertheless, the Examiner continues to confuse optical waveguides with optical switches, as particularly pointed out by the interchanging use of those terms in his arguments (emphasis added):

**"Dorn et al discloses these general steps in forming a waveguide and one of ordinary skill would have obviously used them in the process of the primary reference dependent on the final use desired for the waveguide. While it is noted that the optical switch of Dorn et al does not have a core as set forth in the instant claims, it is submitted that the process of forming additional layers and poling and crosslinking them would have been obvious to add additional cladding and waveguide layers."** (P. 2, Office Action of 08/08/2006).

The arguments below demonstrate that the Office lacks the proper criterion required to establish a prima facie case of obviousness, and therefore the rejections cannot stand for at least the following reasons.

First, the suggestion or motivation to modify (or combine) the Dorn and Zhang references as required by MPEP §2143.01 is absent. Dorn seeks to solve the problem of deflecting light beams by generating refractive index gratings in NLO films using patterned electrodes and mirror assemblies. Not once in Dorn is mention made of total internal reflection or confinement of light within an optically-transmissive core, which is the fundamental principle of a waveguide. Zhang seeks to solve the problem of reducing poling-induced damage to NLO chromophore films, and relatedly, optical loss in waveguides by poling films in an oxygen-free environment. These are two separate and distinct problems that Dorn and Zhang seek to solve, and neither reference provides any indication that one method would enhance the other.

It has been held that (emphasis added) “the mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination,” and “although a prior art device may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.” (*In re Mills*, 916 F.2d 680, 16 USPQ 2d 1430 (Fed. Cir. 1990)). There is no suggestion or motivation in either reference to produce Applicants’ waveguide, primarily because Dorn and Zhang do not seek to solve the same problem. The Examiner presumably attempts to supply the motivation for the combination by simply stating

**“It is nothing but conventional in this art to make multilayered waveguides so that the final element would have the desired refractive index profile and physical properties designed for its ultimate use.” (P. 2, Office Action of 08/08/2006);**

but this is not enough. Aside from the ambiguity of the sentence, Dorn’s device is a multi-layered optical switch, not a waveguide, and so the statement has no basis. The Office must find some motivation to combine the references in a manner so as to create the particular invention that is now claimed (*Northern Telecom, Inc. v. Datapoint Corp.*, 908 f.2d 931 (Fed. Cir. 1990) (“[T]here must be some teaching, suggestion, or incentive to make the combination made by the inventor.”)).

As pointed out in the previous response, Applicants would not be using the poling method described by Zhang because it could destroy the functionality of the claimed waveguide. Zhang creates a single, poled NLO film in a waveguide configuration by placing practically the entire assembled device in a poling apparatus and providing the electric field and heat to effect molecular alignment within the single NLO film. Nevertheless, Zhang has been applied in the instant Office Action:

**“To this end, Zhang et al. has been additionally applied to show a waveguide similar to that of Nutt in which cladding, core, and cladding layers are formed following a poling of these.”**

Nutt discloses forming waveguides by photoablating one (1) NLO material in a stripe pattern; Zhang describes poling one (1) electro-optic polymer layer, with a protective cladding disposed thereon. Applicants’ claim 1 is a method that requires forming two (2) films, each containing a NLO chromophore, specifically to create a refractive index interface between the core and a clad, which confine light to a propagation axis (the core). This method is not taught or suggested in either Zhang or Nutt. The Zhang reference teaches away from Applicants’ claimed waveguide

because if Applicants' device were to be poled using the method of Zhang, the refractive index grating between the core and the clad would be lost. The Examiner did not respond to this point when Applicants presented it in the last response.

Combining Zhang's waveguide with Dorn's optical switch would not make sense, as the purpose of Dorn's device is to deflect light, not confine it. It has been held that "If [the] proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification." (*In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)).

The combination of Zhang and Dorn, if made, would yield a rather absurd device that would be a hybrid waveguide-optical switch with an electrically-induced refractive index grating that both confines *and* deflects light. Applicants claim a method for making a waveguide with an optically transmissive core (the first polymer film) surrounded by a second polymer film with a different refractive index. If the proposed modification or combination of the prior art changes the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious (*In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)). Even if the Zhang and Dorn devices could somehow be merged, it would take significant reconstruction and re-design, as well as a change in the basic principle of operation, and would yield nothing even close to Applicants' waveguide. Such a burden has been used to reverse obviousness rejections in the past (270 F.2d at 813, 123 USPQ at 352).

**"Clearly one of ordinary skill in the optical film poling art would recognize that the general method taught in Dorn et al. would have been applicable to making waveguides of the instant type and those taught in Zhang et al." (Instant Office Action).**

This is untrue. One of ordinary skill in the art of making waveguides would not look to Dorn because the intent of Dorn's device is to deflect light with as much efficiency as possible. As has been stated numerous times, the purpose of a waveguide is to confine light with as much efficiency as possible – the absolute opposite – and therefore a skilled artisan would actually consider Dorn's approach counterproductive to building a waveguide.

Claims 4-14 and 21-26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Zhang et al in view of Dorn et al and further in view of Oh et al in Appl. Phys. Lett 2000, 76(24):3525-3527 for reasons of record as set forth supra and in paragraph 2 of the last office

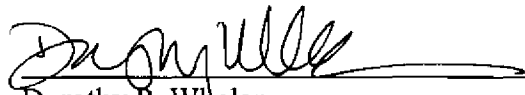
action. Oh describes a method of making ribs of an electro-optic material. There is no suggestion in Oh to surround the formed ribs with another electro-optic material with a different refractive index so as to confine light as it propagates through the core. Oh, therefore, adds nothing to Zhang and Dorn, and certainly does not solve the deficiencies of the primary references with respect to Applicants' method for making a waveguide.

Summary

Claims 1-27 are in condition for allowance. The Examiner has failed to provide adequate basis for his rejections that conform to the requirements of the law. Applicants request an expedited review and concomitant issuance of a patent. It is believed that all of the pending claims have been addressed. However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment.

Respectfully submitted,

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